

Taxonomy of the Family Antedonidae (Echinodermata, Crinoidea, Comatulida) in Korea

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A taxonomic study of the family Antedonidae is presented. The specimens were collected in the coastal seas of Korea from 1970 to 1994 and deposited in the Natural History Museum of Ewha Womans University. Four species, *Heliometra glacialis maxima*, *Antedon serrata*, *Antedon parviflora* and *Andrometra psyche* of the subfamilies Heliometrinae and Antedoninae were identified, of which 3 species, *Antedon serrata*, *Antedon parviflora* and *Andrometra psyche* in the subfamily Antedoninae are new to Korea. The subfamily Antedoninae is reported for the first time in Korea.

The class Crinoidea contains 5 living orders, of which the Comatulida is a free living feather star and the others are sessile lines. The order Comatulida is composed of 17 families comprising the bulk of living crinoids. The family Antedonidae is the largest group of the Comatulida and has round oral pinnules without terminal combs and usually 10 arms with the first two syzygies regularly at 3+4 and 9+10. The taxonomic studies on the Korean crinoids was done by Clark (1909, 1915) and Shin (2001). Clark recorded one species, *Heliometra glacialis maxima* of the Antedonidae and Shin recorded four species, *Comantheria intermedia*, *Comanthus japonicus*, *Comanthus solaster* and *Comanthus parvicirrus*, of the family Comasteridae.

H. g. maxima was reported from the eastern coast of Korea and included in the subfamily Heliometrinae of the family Antedonidae, which is divided into 7 subfamilies. In this study, 4 species of the Antedonidae including *H. g. maxima* were identified, of which 3 species of the subfamily Antedoninae, *Antedon serrata*, *A. parviflora* and *Andrometra psyche*, are new to Korea. The subfamily Antedoninae is reported for the first time in Korea. The crinoid specimens used in this study were collected by scuba diving, shore-collecting and fishery catches from 24 localities (Fig. 1) between August 1970 and July 1994. The collected specimens were fixed in 75% methyl alcohol, and the external feature, shape and arrangement of ossicles were examined with the stereomicroscope for identification. All of the specimens were deposited in the Natural History Museum of Ewha Womans University.

Results

Order Comatulida Clark, 1908
Family Antedonidae Norman, 1865
Subfamily Heliometrinae Clark, 1909
Genus *Heliometra* Clark, 1907
Heliometra glacialis maxima (Clark, 1907)*

Heliometra maxima: Clark, 1907, p. 351; 1913, p. 179.
Heliometra glacialis maxima: Clark, 1909, p. 188; 1915, p. 215; Clark and Clark, 1967, p. 414; Utinomi and Kogo, 1968, p. 52; Kogo, 1998, p. 128, fig. 104.

Material Examined: Pohang, 26 Dec. 1974, 1 ind. (BJ Rho, JI Song); Chuksan, 23 Dec. 1977, 6 inds. (BJ Rho); Geojin, 15 Aug. 1980, 9 inds. (BJ Rho, S Shin); 22 Nov. 1980, 1 ind. (BJ Rho, S Shin); Guryongpo, 12 Jul. 1984, 4 ind.; Jumunjin, 3 May, 1987, 1 ind. (BJ Rho); Sokcho, 29 Jun. 1988, 1 ind. (JW Lee, JE Lee); 4 Aug. 1991, 2 inds. (JI Song).

Remarks: All of the specimens were collected in the East Sea and fit the description of this subspecies by Clark and Clark (1967). However, the size of these specimens is not as large as the description. This subspecies is distinguished from the Arctic subspecies of *H. g. glacialis* in that the arm length of *H. g. maxima* is up to 350 mm but that of *H. g. glacialis* is 260 mm at most. This is not sufficient to distinguish them because, as in this study, the specimens of this west Asiatic subspecies are often reported to be as small as *H. g. glacialis* (Clark, 1909; Kogo, 1998). Further investigation on these two subspecies is necessary once more material becomes available.

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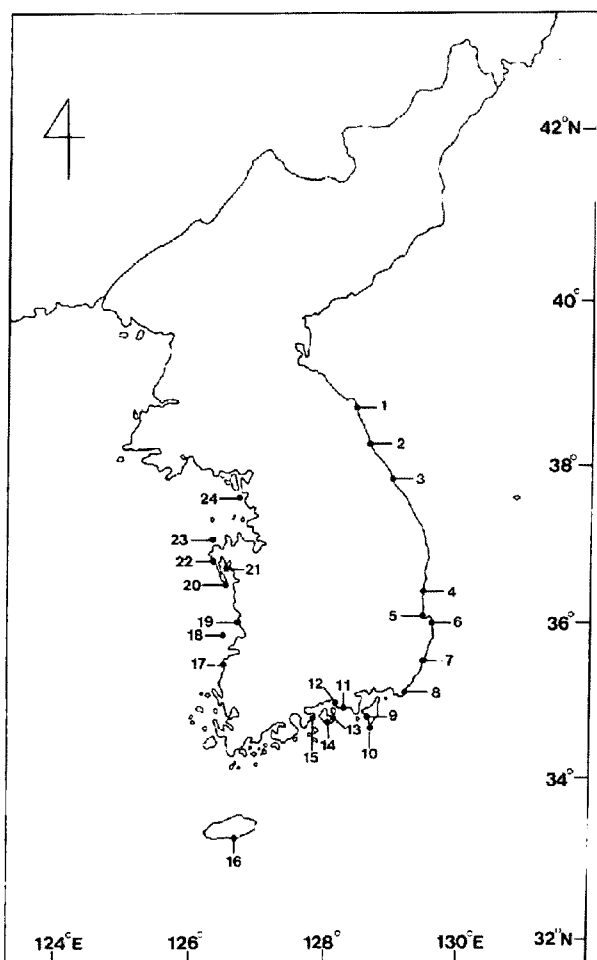


Fig. 1. A map showing the localities where the specimens were collected. A, Geojin. B, Sokcho. C, Jumunjin. D, Chuksan. E, Pohang. F, Guryongpo. G, Ulgi. H, Mipo. I, Dadae. J, Maemuldo. K, Jarando. L, Nukdo. M, Mijori. N, Sangjuri. O, Odongdo. P, Seogwipo. Q, Seocheon. R, Maldo. S, Bieungdo. T, Wonsando. U, Weoldo. V, Sinjindo. W, Deokjeokdo. X, Jakyakdo.

Distribution: Korea(East Sea), Japan, Okhotsk Sea, Cape Patience, Sakhalin Island, The Gulf of Tartary.

Subfamily Antedoninae Clark, 1909
 Genus *Antedon* de Freminville, 1811
Antedon serrata Clark, 1907*
 (Fig. 2)

Antedon serrata Clark, 1907, p. 353; 1908, p. 240; Clark and Clark, 1967, p. 164, fig. 11a-b; Utinomi and Kogo, 1968, p. 52; Liao and Clark, 1995, p. 59, fig. 34; Kogo, 1998, p. 124, fig. 101.

Compsometra serrata: Clark, 1909, p. 192; 1913, p. 179; 1915, p. 215.

Material examined: Seogwipo, 8 Aug. 1970, 1 ind.;

* 가시에쁜고사리. Newly recorded species in Korea.

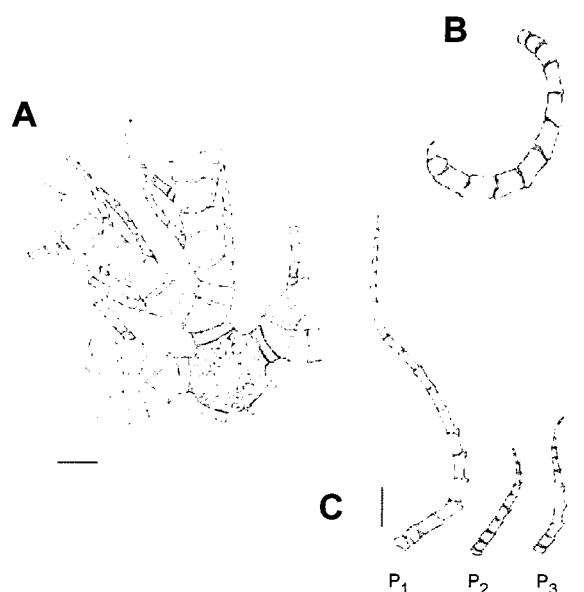


Fig. 2. *Antedon serrata*. A, Centrodorsal and arm bases. B, Cirrus. C, Proximal pinnules. Scale bars = 1 mm.

Bieungdo, 17 Apr. 1972, 1 ind. (BJ Rho); Jakyakdo, 14 Oct. 1973, 3 inds. (BJ Rho); 25 Sep. 1976, 6 inds.; 10 Oct. 1983, 2 inds.; 22 Sep. 1983, 28 inds.; Maemuldo, 29 Dec. 1974, 1 ind. (BJ Rho, JI Song); Mipo, 14 Jul. 1974, 1 ind. (BJ Rho); 29 Apr. 1978, 1 ind. (JH Park, S Shin, SJ Yun); 26 Mar. 1994, 1 ind. (JI Song, JH Won); Odongdo, 10 Jul. 1977, 13 inds. (S Shin, SJ Yun); Mijori, 1 Aug. 1980, 15 inds.; Sangjuri, 22 Nov. 1980, 1 ind. (JI Song, SJ Yun); 20 May, 1981, 3 inds. (JI Song, SJ Yun, HS Choi, JE Seo); Nukdo, 12 Jul. 1984, 2 inds. (BJ Rho, S Shin, JW Lee, JE Seo); Sinjindo, 27 Oct. 1984, 2 inds. (JI Song); Deokjeokdo, 16 Oct. 1985, 29 inds. (JI Song, JW Lee, HS Choi); Seocheon, 6 Apr. 1985, 1 ind. (JI Song); Wonsando, 8 Jul. 1996, 8 inds. (SJ Yun); Maldo, 10 Jul., 1986, 7 inds. (SJ Yun); Weoldo, 15 Sep. 1991, 1 ind. (JH Won); Dadae, 23 Apr. 1994, 1 ind. (JH Won); Jarando, 13 Jul. 1994, 3 inds. (JH Won); Ulgi, 16 Jul. 1994, 1 ind. (JH Won).

Description: Centrodorsal low hemispherical, 1.2-4 mm in diameter, 0.6-1.8 mm high. Polar area small but distinct up to 1.5 mm across in large specimens. Cirrus sockets compactly arranged in 3-4 rows.

Cirri strong, curving and laterally compressed, about XL-LV, 12-15, 5-7 mm long. Proximal two segments broader than long; followings increase in length; longest segment 1.5-2. times as long as broad; distal segments about as long as broad. No dorsal spine at all. Opposing spine small. Terminal claw prominent.

Division series mostly in lateral free. Radials mostly concealed. IBr₁ oblong, 3 times as broad as long. IBr₂ triangular, 1.2-1.5 times as broad as long. No

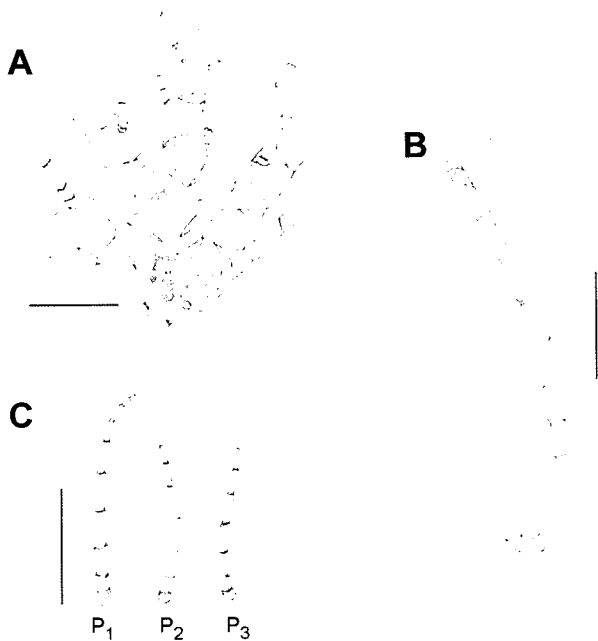


Fig. 3. *Antedon parviflora*. A, Centrodorsal and arm bases. B, Cirrus. C, Proximal pinnules. Scale bars = 1 mm.

synarthrial tubercle on IBr ossicles.

Arms 10 in number, 35-50 mm in length, 0.7-1 mm wide at first syzygy. Syzygial pairs occurring at 3+4, 9+10, 14+15, 18+19 and at intervals of 3.

Pinnules fragile. Pinnules segments long up to 2-3 times as long as central width, provided with prominent spines at distal edges. P₁ 20-30 segments, 7-12 mm long; P₂ 9-11 segments, 3.5-4.5 mm long; P₃, first genital pinnule, 11-13 segments, 4-6.5 mm long; P₄, P₅ closely resembles P₃.

Remarks: This species is distinguished from the other antedons by the pinnules with the spinous distal edges and cirrus segments not more than twice as long as wide. We found that some of the specimens which were collected from the southern coast of Korea in July carried a considerable number of embryos on their pinnules or cirri. The other specimens also had variably developed eggs on their pinnules beyond the second, but most of those collected between August and October did not.

Distribution: Korea(Korea Strait, Yellow Sea), Japan, Fukien province, China, The Formosa Channel.

Antedon parviflora (Clark, 1912)*
(Fig. 3)

Compsometra parviflora Clark, 1912. p. 133.

* 가는수염에쁜갯고사리. Newly recorded species in Korea.

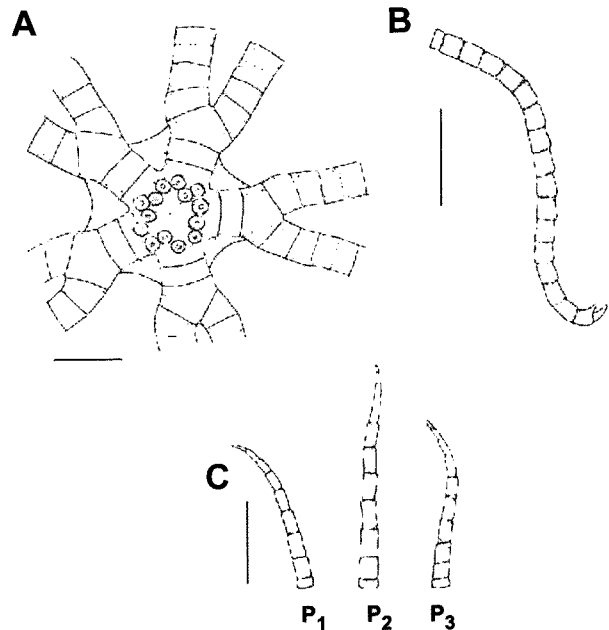


Fig. 4. *Andrometra psyche*. A, Centrodorsal and arm bases. B, Cirrus. C, Proximal pinnules. Scale bars = 1 mm.

Antedon parviflora : Clark and Clark, 1967, p. 147, fig. 9b-c; Utinomi and Kogo, 1968, p. 52; Clark, 1972, p. 141; Liao and Clark, 1995, p. 59, fig. 33; Kogo, 1998, p. 123, fig. 100.
Material examined: Seogwipo, 30 Nov. 1978, 1 ind. (BJ Rho, JJ Shim, JI Song).

Description: Centrodorsal conical, 0.9 mm in diameter, 0.6 mm high. Polar area small about 0.2 mm across. Cirrus sockets compactly arranged in 2-3 rows.

Cirri fragile, about XXXV, 10-14, up to 3-4 mm long. Proximal two segments broader than long, followings rapidly elongated 4-5 times as long as broad. No dorsal spine. Opposing spine and terminal claw prominent.

Division series mostly in lateral free. Radials mostly concealed. IBr₁ oblong about 4 times as broad as long with median portion in lateral view concealed by IBr₂. IBr₂ rhombic slightly longer than broad.

Arms 10 in number, about 2.5 mm in length, 0.5 mm wide at first syzygy. Syzygial pairs at 3+4, 9+10, 14+15, 18+19, and at intervals of 3.

Pinnules fragile. Pinnule segments beyond third elongated 2-3 times as long as broad. P₁ 9-10 segments, 2 mm long; P₂ 6-8 segments, 1.5 mm long; P₃ similar to P₂ but very slightly smaller.

Remarks: This small and delicate specimen is not complete because of broken arms, but has distinct cirri, the longest segments well over twice as long as their median width. This specimen has a considerable resemblance *A. longicirra* (Clark, 1912) described by Clark and Clark (1967). *A. longicirra* is reported to

have cirri with 12-17 segments while this species has 8-11 segments. Our specimen has cirri of 10-14 segments which represents both species. The cirri of this species are slender and easily separated, which makes it difficult to count the number of segment in all cirri precisely. *A. longicirra* on the other hand has very long hairlike cirri, from 7 to 11 mm, and was recorded only in the western coast of Flores.

Distribution: Korea (Jeju Island), Japan, Banda, Timor, Flores, Southern Philippines, The Bonin Islands, The Maldive Islands.

Genus *Andrometra* Clark, 1917
Andrometra psyche (Clark, 1907)*
(Fig. 4)

Antedon psyche Clark, 1907, p. 353; 1908, p. 241.

Iridometra psyche : Clark, 1915, p. 215.

Andrometra psyche : Clark and Clark, 1967, p. 81; Utinomi and Kogo, 1968, p. 51; Clark, 1972, p.139; Kogo, 1998, p. 119, fig. 96.

Material examined: Seogwipo, 10 Jun. 1993, 1 ind.

Description: Centrodorsal low hemispherical to almost discoidal, 1 mm in diameter. Polar area broad about 0.8 mm in diameter. Cirrus sockets arranged in 2 rows.

Cirri about XX, 17-20, 3-4 mm long. First segment broader than long, followings as long as broad, longest segments not over 1.5 times long as broad. No dorsal spine. Opposing spine prominent, its height equal about a half of the width of penultimate segment. Terminal claw curved, slightly longer than penultimate segment.

Division series in lateral free. Radial easily visible, oblong, two third long as IBr₁. IBr₁ oblong, 2.5 times as broad as long. IBr₂ low pentagonal. Synathrial tubercles between IBr ossicles obtuse, only slightly elevated.

Arms 10 in number, broken, presumably 1.8 mm in length, 0.6 wide at first syzygy. Syzygial pairs at 3 + 4, 9 + 10, 13 + 14 and at intervals of mostly 3. Both

neighbor Br1 brachials in lateral contact each other.

Pinnules short. First pinnule segment broader than long, followings elongated up to 2 times as long as broad. P₁ 10-11 segments, 2 mm long; P₂ 10-12 segments, 3 mm long; P₃ 10-12 segments, 2 mm long.

Remarks: The genus *Andrometra* has P₂ much longer than P₁ and P₃. This species is similar to *A. indica* (Clark, 1909) except that the latter has cornical centrodorsal and more segmented pinnules with P₂ and P₃ of 15 segments.

Distribution: Korea (Jeju Island), Japan (from the Goto Islands to Sagami Bay), Northern Somalia.

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